NOTES ON CENTRAL AMERICAN MARANTACEAE I. NEW SPECIES AND RECORDS FROM PANAMÁ AND COSTA RICA[1]

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ABSTRACT

Four new species of *Calathea* (Marantaceae) are described from Costa Rica and central Panamá. Synonymies and misidentifications are discussed. Data on pollination are given.

The large herbaceous monocots, especially the Scitamineae, are a conspicuous element of most lowland semi-deciduous to wet tropical forests. In spite of their showy nature they are poorly known. In Central America they flower primarily during the rainy season when many roads are impassable, thus discouraging many collectors. Since they are frequently bulky and awkward to press, they may be purposely overlooked by botanists. Their most important and distinctive features, the habit of growth, form of the inflorescence and flowers, are commonly obscured or lost in herbarium specimens, thus abetting misidentification and confusion and making field work essential for their understanding. While working on the pollination of the family Marantaceae, it became evident that a large part of the Costa Rican and Panamanian species were undescribed. There are 23 species recorded in the *Flora of Panama*; to date I have found 19 additional undescribed or unrecorded species of Marantaceae in Panamá. In *Calathea* alone, there are an additional 16 species, 11 of which are undescribed. Surprisingly, all but two are from central Panamá: Cerro Jefe and La Eneida, Cerro Campana, Santa Rita Ridge and Río Guanche, near Portobelo. On the lower Río Guanche alone, there are seven undescribed Marantaceae. To be sure, several of these and the species from Santa Rita are decidedly South American (Colombian and upper Amazonian) in affinity, and undescribed from there either. There are surely other new species yet to be found in the Atlantic coastal forests, the Osa Peninsula, Costa Rica, and the mountains of Darién, Panamá.

The Marantaceae may always be recognized vegetatively, from seedling stage onward, by the pulvinus (a region of specialized cells just below the leaf blade) and the major (longitudinal) veins which form a sigmoid curve with evenly spaced, parallel transverse veins between them and at right angles to them (these seen if the leaf is held up to the light) (Tomlinson, 1961: 62). Florally the family is characterized by the spring mechanism of the style and stigma. The showy portion of the flower usually consists of the sterilized, often petaloid, staminodes (see Fig. 1c): outer staminode, callose staminode, and the cucullate staminode which holds the style in place before pollination. While in bud the pollen is transferred from the anther to a depression (see Fig. 1c) in the style immediately

[1] I wish to thank Dr. Robert L. Dressler for showing me several new species localities, for reading the manuscript, and for assistance and guidance without which this study would not have been possible; Robin Foster for showing me the Rio Guanche site and for use of his vehicle for field work; Drs. R. L. Wilbur and G. L. Webster for reading parts of the manuscript; and Dr. Robin Andrews for help in typing the manuscript.

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ANN. MISSOURI BOT. GARD. 60: 413–426. 1973.

behind the cup-like terminal stigma. During pollination, the pollinator (bees of the genus *Calathea*) inserts the head and proboscis or proboscis (beak?) only into the flower displacing the cucullate appendage and thus releasing the style which is under tension. It snaps upward (and slightly sideways in *Maranta*, *Ctenanthe*, and *Thalia*) bringing the stigma into contact with the pollen previously deposited on the pollinator's body and simultaneously depositing its own pollen in the same place. The style then comes to rest against the callose staminode (see Fig. 1c). In the case of *Calathea* the pollen is deposited in the proboscidial fossa. The flowers normally open spontaneously (see Figs. 1c and 3c), but there is also a group in which the buds remain closed (see Fig. 4b) until forcibly opened by the bee. The latter situation prevails in one group of Calatheas corresponding to a portion of the series Scapifoliae of Schumann (1902). This very specialized condition is quite distinct from cleistogamy. There are a few which are truly cleistogamous, notably *Calathea panamensis* Rowlee *ex* Standl., but they are not closely related to the above mentioned group. In the great majority of Marantaceae species it is mechanically impossible to get pollen in the stigma of the same flower, however, certain species of *Maranta* appear to be exceptions to this rule.

Calathea dressleri H. Kennedy, sp. nov.—FIGURE 1.

Acaulis. Planta ad 45 cm alta. Folia ad 2 cm longa petiolata, petioli pars superior ad 1.5 cm longa complanata callosa supra puberula obovata vel late elliptica raro suborbiculata basi acuta vel obtusa supra glabra splendens prope medianum minutissime puberula obscure viridia et prope medianum pallidius maculata subtus pallide viridia vel atroviolacea; vagina subglabra ad 19 cm longa. Spica e rhizomate capitata subglobosa ad 5.5 cm longa et ad 5 cm diametro pedunculo 5–23.5 cm longo subglabro sustenta; bracteae 14–17 spiraliter dispositae ovatae vel late lanceolatae 2.45–3.5 cm longae et 1.5–2.7 cm latae herbacea intus albae vel pallidae violacea extus pallidae violacea obtusae apice recurvata, laxius imbricata; paria florium 3 bracteolis indurato-claviculatis exsertis et mesophyllis comitata; ovarium glabrum album 1.3–1.7 mm longum; sepala 19 mm longa et 2.5–3 mm lata, lineari-lanceolata glabra; corollae tubus 23 mm longus albus vel subviolaceus glabrus, lobi ovati vel lanceolate 9–13 mm longi et 4.5–5.3 mm; staminodium exterius album vel subviolaceum late ovatum vel orbicularum emarginatum 9 mm longum et 6 mm latum; callosum spatulatum 1 cm longum et 0.8 cm latum; cucullatum 7 mm longum. Capsula 9–10 mm longa calyce demum coronata; semina trigona dorso rotundata rugosa, arillo lamelloso albo.

Rosulate herb, to 45 cm high. Plants frequently of several leafy shoots, with 2–5 leaves each. Rhizome 0.8–1 cm in diameter, internodes ca. 0.5 cm. Leaf sheath herbaceous, minutely tomentose to subglabrous, green to greenish-purple, 5–19 cm long, frequently auriculate at the apex, disintegrating with age. Petiole absent or to 4.5 cm long, minutely tomentose. Pulvinus slightly swollen, puberulent above, 0.6–1.5 cm long. Leaf blade herbaceous, entire, obovate to broadly elliptic, occasionally suborbicular, margin and leaf surface undulate, apex rounded with a point, base acute to obtuse, 17–30 cm long and 12–17 cm wide; the upper surface dark green with an irregular yellow-green band about ¼ the leaf width along the midrib, glabrous except for the tomentose midrib, covered with minute papilli (appearing as depressions on dried specimens) giving it a velvety sheen; the lower surface similarly covered but the interspersed stomata giving it a more or less dull aspect, varying from light grey-green to dark purple in color, glabrous except minutely puberulent (14×) on midrib and major veins. Cataphylls of

FIGURE 1. *Calathea dressleri* H. Kennedy.—A. Habit (scale in cm).—B. Inflorescence.—C. Snapped and pollinated flower with detail of staminodes, stamen, style and stigma (note cup-shaped stigma).—D. Seeds and dehisced capsules (each showing two of the three sections).—E. Flower, entire (small scale divisions 1 mm).

leafy shoots 1–2, green tinged with purple to dark purple, linear to narrowly oblong, to 15 cm long, usually 6–10 cm long, subglabrous to minutely tomentose especially at the base. Scape arising directly from the rhizome, subglabrous to minutely tomentose, 5–23.5 cm long, green to purple-green, pink at junction with the inflorescence, subtended by to 4 lanceolate, purple subglabrous scale leaves, 2.6–9.5 cm long and 0.8–1.8 cm wide. Inflorescence lax, sub-globose, 3.3–5.5 cm long and 3.2–5(–6) cm wide. After flowering the peduncle bends at the base, reflexing the inflorescence to the ground. Bracts 14–17, occasionally more, herbaceous, whorled, spreading and reflexed at the apex, ovate to elliptical, 2.45–3.5 cm high and 1.5–2.7 cm wide, apex obtuse, slightly pubescent on the abaxial surface; adaxial surface pure white with or without green markings on the margins or tinged light purple, abaxial surface pale purple-pink at base fading toward tip or uniformly pink-purple; each subtending 3 flower pairs; the latter provided with an indurate claviculate bracteole to 1.9 cm long. Prophyll bicarinate, membranous 2.0 cm long, oval, acute, glabrous to subglabrous. Flower opening spontaneously. Sepals narrowly ovate-linear, acute, hyaline, white, persistent in fruit, 19 mm long and 2.3–3 mm wide. Corolla tube white, glabrous, ca. 23 mm long; petals ovate, acute to obtuse, 0.9–1.3 cm long and 4.5–5.3 mm wide. Outer staminode white to pale purple, broadly ovoid to orbicular, clawed at the base, emarginate, 9 mm long and 6 mm wide. Callose staminode spatulate, tinged purple at the apex, petaloid, 1 cm long and 0.8 cm wide. Cucullate staminode ca. 7 mm long and 4–4.5 mm wide, purple at the apex provided with a filiform appendage 2–2.3 mm wide; anther 2 mm long. Ovary white, glabrous, 1.3–1.7 mm long. Stigma and style white. Capsule thin, white, with fleshy, raised apical rim and crowned by a withered persistent calyx, 9–10 mm high and 7 mm wide. Seeds 3 per capsule, trigonous, rugose on the outer surface, pinkish-brown, 4.5–5 mm long and 4 mm wide, provided with a white basal aril, 2–2.5 mm high.

PANAMÁ. PANAMÁ PROVINCE: La Eneida, region of Cerro Jefe, 750 m elevation, 8 July 1969, *H. Kennedy, R. L. Dressler & N. H. Williams 300* (COL, DAV); 13 September 1970, *H. Kennedy 500* (NY, PMA); woods around La Eneida, 5 August 1970, *J. Luteyn & H. Kennedy 1759* (DUKE); La Eneida, region of Cerro Jefe, 750 m, 11 August 1971, *H. Kennedy, R. L. Dressler & H. Wiehler 1111* (holotype MO; isotypes DAV, F, GH, K, US).

Flowering June to October. The population was growing on the steep banks above a stream. Though this was the only location observed, it may occur scattered throughout the cordillera toward Colombia. The plant was observed to be pollinated by *Euglossa nigrosignata* Moure at the type locality. It is quite distinct from any other known Panamanian *Calathea* in having the scape arise directly from the rhizome, patent to recurved white, herbaceous bracts, and undulate, beautifully marked leaves.

This species is named in honor of Dr. Robert L. Dressler, who first discovered it and made possible my collections of it and several other new species and whose assistance has been invaluable to my research.

Calathea venusta H. Kennedy, sp. nov.—FIGURE 2.

Planta modice robusta ad 1.43 m alta. Folia breviter (ad 1.9 cm) petiolata, petiolus tota longitudine callosus teres supra puberulus, plus minus inaequilatera anguste elliptica acuminata basi inaequilatera acuta mediano supra minutissime puberula ceterum utrinque glabra

FIGURE 2. *Calathea venusta* H. Kennedy (scale in cm).—A. Habit, note clustered spiral leaves on both flowering and juvenile plants.—B. Inflorescence, note difference between sepals persistent on capsule and those of flower.—C. Snapped flower and capsule with persistent calyx (on leaf), note tridentate outer staminode.—D. Capsule with persistent calyx, dehisced capsule and seeds.

herbacea ad 34 cm longa et ad 10.5 cm lata; vagina virida super puberula ceterum utrinque glabra. Spica cum floribus ad 8 cm longa cylindrica vel subovoidea complanata folio comitata pedunculo gracili ad 17 cm longo sustenta; bracteae paucae ad 11 spiraliter dispositae ad 3 cm altae subreniformae vel depresse ovatae obtusae cum acumin subcoriaceae glabrae smaragdinae; paria florum ultra 6 mesophyllis et bracteolis membranaceis comitata; ovarium glabrum; sepala anguste oblongo-elliptica ad 3.25 cm longa; corollae tubus albus ad 4 cm longus lobi anguste oblongo-elliptici ad 1.6 cm mentientes; staminodium exteris obtriangularum tridentatum; callosum rectangularum ad 1.1 cm longum; cucullatum 9 mm longum. Capsula ovoidea ad 1.5 cm alta calyce demum coronata; semina rugosa trigona schistacea ad 1.05 cm alta, arillo albo munita.

Cauline herb 1.14–1.43 m high. Rhizome to 1.9 cm in diameter. Juveniles and subadults bearing 9–17 leaves, the uppermost of which are markedly reduced in size; the adult plant bearing 5–7 closely clustered cauline leaves supported upon an elongate stem internode, 0.9–1.01 m long. Leaves arising as distichous pairs but arranged spirally through twisting of the stem. Cataphylls (1–)2–3, narrowly ovate to linear-ovate, obtuse to acute, mucronulate, glabrous, occasionally outer 1 or 2 subglabrous with microscopic (14×) hairs, dark green or clouded green-purple; shiny green, glabrous within, thin, pliable, membranaceous above, basal portion fleshier, semi-coriaceous, remaining alive and green throughout flowering, 7–40 cm long, the innermost one 31–40 cm long. Stem olive green, drab, darker at base, lighter above, dark green-purple just below node, glabrous. Leaves 5–7 on flowering shoots, oblique, narrowly elliptical, apex acuminate, base unequal, acute, 23.2–34 cm long and 6.4–10.5 cm wide; the upper surface shiny deep grass green, midrib yellow-green, glabrous except for distal ½ of midrib puberulent, lower surface grey-green, opaque, glabrous, midrib yellow-green. Pulvinus olive green puberulent on upper side and at the basal junction with the leaf sheath, the rest glabrous, 0.6–1.9 cm long. Petiole absent or extremely rare. Leaf sheath stiff, parchment-like, center back hispid for to 8–10 cm, margins and rest of the leaf sheath glabrous, not auriculate, green, toward base dark greenish-purple, quite dark just above the node, 10.7–15 cm long in subtending leaf, others 14.5–23 cm long. Nodal area slightly swollen, yellow-green. Stem glabrous, rarely with microscopic hairs on the portion covered by the cataphylls, green to olive green, darkest at base. Inflorescence terminal, subtended by a foliage leaf, lax, cylindrical to subovoid, 6.8–8 cm high and 2.8–4.5 cm wide. Peduncle green, glabrous, 11.3–17 cm long. Bracts 8–11, spiral, spreading, apex patent to occasionally slightly recurved, subreniform to depressed ovate, apex obtuse with a point, semi-coriaceous, glabrous, shiny, grass green, apical portion turning dark purple with age, pale green, glabrous, within, 2.5–3 cm high and 4.3–5.8 cm wide; each subtending at least 6 flower pairs. Bicarinate prophyll rotund, membranaceous, translucent, yellow-green, tinged purple at apex with age, glabrous, ca. 2.4 cm long and ca. 2.4 cm wide. Mesophyll membranous, broadly elliptical, apex truncate, translucent yellow-green, glabrous, ca. 2.25 cm high and 1.9 cm broad. Bracteoles subtending individual flowers, membranous, glabrous, pale yellow-green, 2.3–2.4 cm long and 0.3–0.4 cm wide. Flower never opening spontaneously. Ovary cream-white, glabrous, 3 mm high. Sepals boat-shaped, narrowly oblong, obtuse, marginal edges inrolled, appearing acute. margins membranous, center and base semi-spongy, glabrous, basal ⅓ of sepal white, upper ⅔ chartreuse green, 3.1–3.25 cm long and 0.9–0.95 cm wide, living and persistent on capsule, becoming dark purple or green tinged with purple with age. Corolla tube white, glabrous, 3.8–4 cm long; corolla lobes unequal, narrowly oblong elliptic, obtuse, cream-white tinged faint yellow-green at apex, 1.5–1.6 cm long and 0.55–0.83 cm wide. Outer staminode obtriangular, tridentate, white, 1–1.1 cm long and ca. 0.6 cm wide. Callose staminode rectangular, apex truncate, irregularly bidentate, deep cream color, 1–1.1 cm long. Cucullate staminode cream colored at apex, golden to pale orange below, ca. 0.9 cm long and 0.5 cm wide, bearing a small, spoon-like appendage. Stamen cream to yellow-orange, bearing a reduced lateral

appendage to 1.5 mm wide, anther 3 mm long. Style and stigma golden. Capsule obovoid, smooth, thin, rounded at the apex, yellow-green to yellowish with tinge of purple at the apex, 1.25–1.5 cm high and 0.95–1.05 cm wide, crowned by a purple to purple-green expanded live calyx, sepals oblong, 3.5–3.9 cm long and 1.2–1.3 cm wide. Seeds usually 3 per capsule, trigonous, slate grey, rugose on outer surface, 0.9–1.05 cm high and 0.5–0.6 cm wide, bearing a basal white aril 3–4 mm high.

PANAMÁ. COLÓN PROVINCE: Río Guanche, mature forest about 1.5 miles upstream from bridge, ca. 10 m elevation, 27 September 1971, *H. Kennedy 1158* (paratype K); 1 November 1971, *H. Kennedy 1234* (holotype MO; isotypes F, US).

Flowering September through December. This species was pollinated by *Eulaema speciosa* (Mocs.) at the type locality. It was first known solely from the type locality but has since been found at La Lola, near milla 28, Limón Province, Costa Rica. This species differs from other Panamanian and Costa Rican Calatheas in having clustered leaves terminating an elongate stem, in the few apically patent, green, glabrous bracts, and its virtually total glabrousness. It is most closely related to *Calathea donnell-smithii* K. Schum. and is distinguished from it by the patent to recurved bract margins, the spiral and very close arrangement of the leaves instead of distichous and more widely spaced leaf arrangement. This is not so closely related to Woodson's *Calathea foliosa*.

The name is derived from the Latin venustus, meaning graceful, lovely.

Calathea robinae H. Kennedy, sp. nov.—FIGURE 3.

Planta gracilis 30–59 cm alta caespitosa, radicibus filipendulis. Folia inequilatera, elliptica acuminata basi obliqua acuta vel obtusa utrinque villosa. Spica laxa subglobosa utrinque villosa; bracteae 5–12 spiraliter dispositae herbaceae, smaragdinae ovate vel anguste ellipticae subcaudatae; paria florum 6 vel ultra, bracteolis indurato-claviculatis; ovarium glabrum; corollae tubus luteus, lobi lutei; staminodium exterius suborbiculatum lutem; callosum simile. Capsula viridia.

Herb 30–59 cm tall. Rhizome poorly developed, 6–8 mm in diameter. Roots bearing tuber-like storage organs to 2 cm long and 1.0 cm in diameter. Individuals forming clumps of leafy shoots. Branch shoots arise from the axils of older leaves; the stem portion lying horizontally along the ground or ascending obliquely, rooting at the nodes, the leaves upright. Cataphylls narrowly oblong-ovate, mucronulate, chartaceous, purple mottled with green, villose, glabrous within, innermost ones to 14 cm long. Leaf blade herbaceous, elliptic, unequal, apex acuminate, slightly eccentric, base acute to to obtuse, ca. 90°, suboblique, every other lateral vein raised giving a shallowly pleated appearance, (8.7–)11.5–21.5 cm long and (3.1–)4.3–7.5 cm wide; the upper surface deep green, slightly glittering; the lower surface pale, almost whitish grey-green, lateral veins dark green, the midrib yellow-green. Leaf villose throughout, hairs erect, up to 5 mm long. Pulvinus light yellow-green, villose, 0.7–1.6 cm long. Petiole villose, green or purple mottled with pale green, (1.3–)6–16.8 cm long. Leaf sheath herbaceous, villose, commonly mottled purple occasionally mottled greenish-purple, the basal 2–3 cm thickened, fleshy, especially if lying along the ground and commonly pale purple to whitish, 9–18.7 cm long. Inflorescence terminal, arising basally with internodes much reduced lax, subglobose to turbinate, 2.2–4

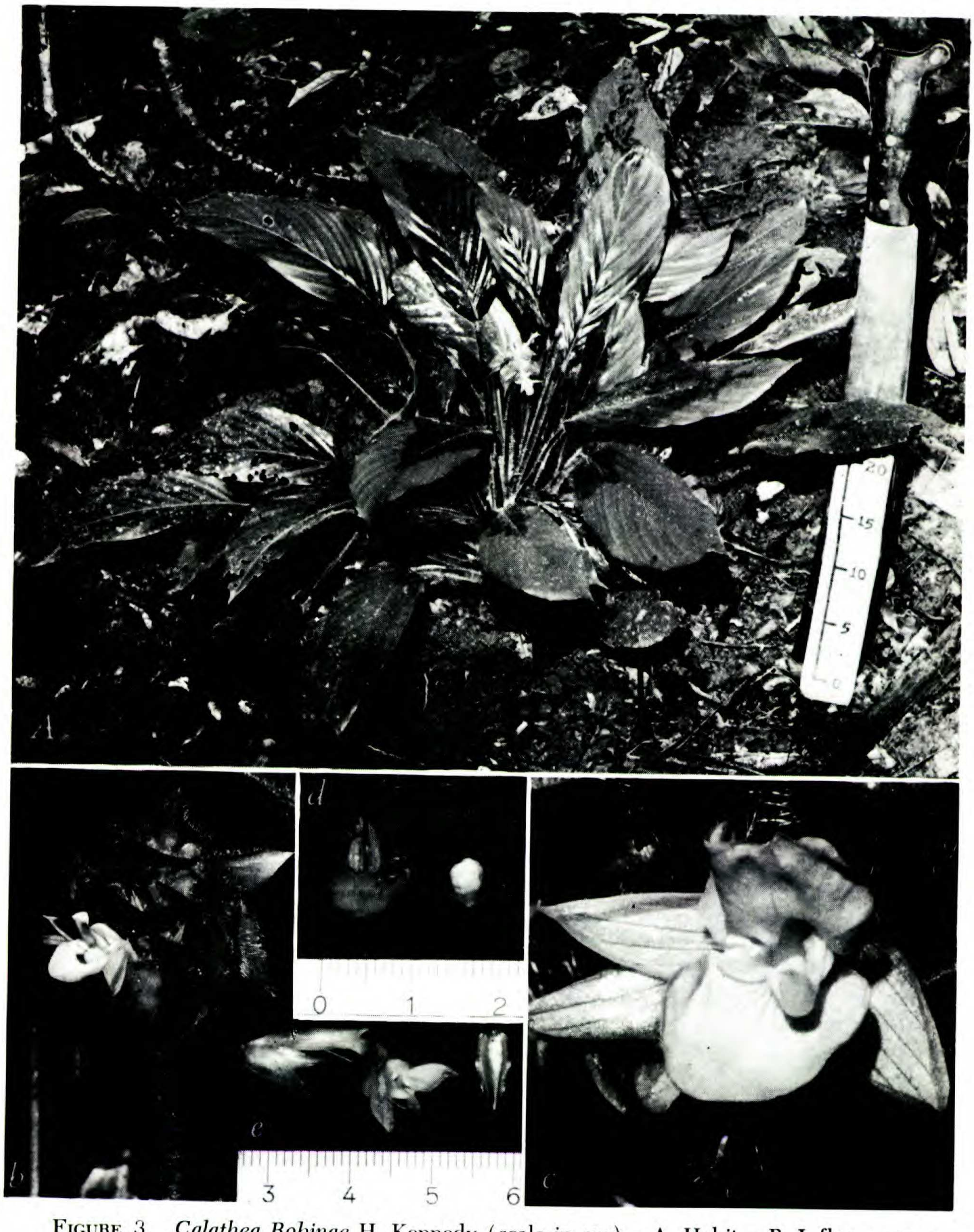

FIGURE 3. *Calathea Robinae* H. Kennedy (scale in cm).—A. Habit.—B. Inflorescence.—C. Open, unsnapped flower.—D. Capsule with persistent sepals and seed—E. Flower with mesophyll and claviculate bracteole attached, on the right, the bicarinate prophyll.

cm high and 3.5–4.5 cm in diameter (bract tip to bract tip) when living; after flowering, the peduncle frequently bends, reflexing the inflorescence to the ground. Peduncle villose, mottled purple and light green, (12–)18–30.6 cm long. Bracts 5–12, herbaceous, spirally arranged, spreading, apex elongated, patent to slightly recurved, 2.2–3.2 cm high and 1.1–2.7 cm wide. Lowermost bracts

(basally) transversely elliptic, the apex caudate to acuminate; the mid and upper bracts becoming ovate to elliptic or narrowly elliptic, acuminate to subcaudate, each subtending at least 6 flower pairs. The basal, imbricate, portion of the bract yellow-green, glabrous within; densely villose on abaxial surface and of thicker texture than the patent, apical portion. Apical portion of bract villose, deep green above; abaxial surface grey-green, veins dark green, very similar to leaves in color and texture. Bicarinate prophyll membraneous, broadly ovate, obtuse, translucent white at base, apex pale green, back and carina glabrous back occasionally sparsely villose towards apex, sides densely villose; glabrous within, 1–1.2 cm high and 0.9–1.05 cm wide. Tricarinate prophyll similar in color and pubescence. Mesophyll membranous, broadly ovate to triangular, apex acute to acuminate, translucent white at base, apical ¾ light green, outer surface densely short villose, glabrous within, 1–1.2 cm long and 0.8–0.85 cm wide. Bracteoles subtending individual flowers absent. Each flower pair subtended by an indurate claviculate bracteole, 1.2–1.6 cm long; the lower portion thin, flattened, translucent, white, apical ½ indurate, yellow, triangular in cross section. Flower opening spontaneously. Sepals herbaceous, narrowly elliptic, apex acute to subacuminate, villose, whitish opaque basally, apical ½–⅓ pale green, margins hyaline, 1.35–1.5 cm long and 0.4–0.45 cm wide. Tube glabrous, yellow, 1.55–1.65 cm long, the basal nectar reservoir enlarged, ca. 0.5 cm long. Petals subequal ovate to narrowly ovate, acute, bright yellow, 1–1.1 cm long and 0.45–0.55 cm wide. Outer staminode clawed at base, apical portion elliptic to suborbicular, apex rounded, bright yellow, 1–1.5 cm long and 0.75–1.05 cm wide. Callose staminode petaloid, base broadly clawed, apical portion transverse elliptic to suborbiculate, apex emarginate, bright yellow, 1.05–1.2 cm high and 0.8–1 cm wide. Cucullate staminode yellow 0.55–0.65 cm long and 0.4–0.45 cm wide; appendage relatively long, finger-like, ca. 2.2 mm long. Anther yellow ca. 1.5 mm long, filament yellow, with petaloid appendage to 1.5 mm wide, upper ¾ of anther free. Ovary glabrous, white, ca. 1.5 mm high. Capsule trigonal, fleshy, translucent green, glabrous with a raised rim apically, apical edge of each face tridentate to irregular. Seeds usually 3 per capsule, trigonous, convex, rugose on the outer surface, 4–4.5 mm high and ca. 4 mm broad, bearing a white basal aril to 2.5 mm high.

COSTA RICA: LIMÓN PROVINCE: Old forest about 2 miles from La Lola on the road to Siquirres, near stream bed, 26 February 1972, *H. Kennedy, R. Andrews & R. L. Dressler 1379* (holotype F; isotypes BM, COL, CR, DAV, DUKE, GH, K, MO, NY, U, US).

Flowering February and March. The plants were observed along the banks of the stream on the slopes at a fairly constant level above the stream bed. The mottling of the petioles, leaf sheathes, and other parts is due to the absence of purple pigment and apparent reduction of chlorophyll in the raised basal cells of the individual hairs. This plant is readily distinguished from other Costa Rican and Panamanian Calatheas through being villose throughout, possessing green herbaceous bracts, yellow flowers, claviculate bracteoles, glabrous ovary, and the absence of bracteoles subtending the individual flowers.

This species is named in honor of Dr. Robin Andrews on whose study site it was discovered and with whom the collection was made.

Calathea vinosa H. Kennedy, sp. nov.—FIGURE 4.

Planta robusta elata 1.3–2.3 m alta. Folia longe petiolata, oblonga vel lineari-oblonga obtusa cum acumin basi rotundata vel truncata supra metallica atrocyanea glabra subtus vinosa tomentosa, trichomae uncinatae. Spica late cylindrica vel subovata pedunculo vinoso; bracteae spiraliter dispositae, initia reniformae ceterum late ovato-trullate saepe eburnae velutinae recurvatae ceterum stramineae extus velutinae; bracteolis membranaceis summis puberulis prophyllis et mesophyllis puberulis; corollae tubus albidus, lobi eburni; staminodium callosum rectangularum. Capsula obovata straminea; semina schistacea.

Caulescent herb 1.3–2.3 m high. Shoots with 1–2 elongate internodes above ground, bearing 2–4 leaves. Cataphylls coriaceous, thicker and somewhat fleshy toward base, ovate to narrowly ovate-triangular, apex acute to obtuse, mucronulate, subglabrous to finely tomentose (both straight and retrorsely barbed hairs) at the apex and margins, abaxially red-purple, adaxially light green and glabrous; upper portions rotting away with age, innermost cataphyll 60–93 cm long. Leaf blade oblong to linear-oblong, occasionally narrowly ovate in smaller leaves, apex obtuse to rounded with a point, base rounded to truncate, junction of blade to pulvinus shortly acuminate, coriaceous, stiffer than pliable, 65–105 cm long and 17.5–38.7 cm wide. Leaf blade above glabrous, dark semi-metallic bluish-green, midrib puberulent, light yellow-green. Leaf surface below dark red-purple, densely tomentose with retrorsely barbed hairs, each hair arising from a swollen bulbous base. Pulvinus terete, glabrous except for row of hairs above, dark red-purple commonly concolorous, or petiole occasionally slightly darker or lighter, confluent with petiole and virtually of same diameter, (3–)5.5–15 cm long. Petiole glabrous to subglabrous with a few scattered hairs along upper surface, occasionally bearing a faint, shallow groove to 1.5 mm wide on the upper side, 0.9–57.5 cm long; petiole of the uppermost, subtending, leaf 0.9–29 cm long, others to 59 cm long. Leaf sheath not auriculate, centrally glabrous with the clasping margins moderately short pubescent with straight hairs, becoming especially dense at the apex, stiff semibrittle, dark red-purple; glabrous, whitish green within; sheath of uppermost subtending leaf 17–31.5 cm long, others 48–144 cm long. Base of the leaf sheath, node, and upper 2–3 cm of the internode puberulent. Inflorescence terminal, peduncle subtended by a foliage leaf. Peduncle minutely tomentose with straight hairs, dark red-purple, 10–19 cm long. Inflorescence lax, broadly cylindrical to slightly ovoid, 12–14(–16.8) cm high and 7–8.5 cm in diameter. Bracts spiral, first few reniform, apex obtuse, later bracts longer and narrower, broadly trullate-ovate to trullate-ovate, apex acute to acuminate, often slightly excentric, outer margin and apex recurved, occasionally patent in young inflorescences, coriaceous, 3.6–5.5 cm high and 4.3–6.6 cm broad. Basal portion of bract pale straw-colored, recurved apical margin ivory or faintly tinged greenish white; upper bracts often bearing slight streaks of purple adaxially at the apex, outer surface and recurved margin densely velvety pubescent, basal half of inner surface glabrous. Each bract subtending to six flower pairs. Bicarinate prophyll broad transversely elliptic, obtuse, membraneous, translucent pale yellowish-green, densely puberlent, glabrous within except apex and margins, (2.5–)2.6–2.9(–3.1) cm high. Mesophyll membraneous, translucent, white, subglabrous at base, upper half pale yellow-green, densely puberulent. Bracteole subtending individual flowers, membraneous,

FIGURE 4. *Calathea vinosa* H. Kennedy (scale in cm).—A. Habit.—B. Inflorescence, note closed flower, lower right, snapped flower above.—C. Flowers, closed at left; center showing style and outer staminode; rightmost flower note stamen attached to callose staminode; extreme right, callose staminode alone.—D. Capsule bearing enlarged persistent sepals and in center, seeds with basal aril.

puberulent at apex. Flower never opening spontaneously. Sepals oblong to narrowly obovate, apical margins infolded, appearing acute, pale yellow, glabrous, 3.55–3.9 cm long and (0.9–)1.05–1.3(–1.5) cm wide, about 0.5 cm wide at base. Corolla tube glabrous, white at base, cream-colored above, 4.2–4.5 cm long; petals oblong to subobovate, obtuse, glabrous, cream-colored, subequal, 1.6–1.75 cm long and 0.8–1.1 cm wide. Outer staminode narrowly obovate to obtriangular, bifid, apical half shallowly cupped, white, 1.1–1.3 cm long and 6–7.5 mm wide. Callose staminode rectangular, apex truncate, irregular, with a small point in the center, completely callose, pale golden, 1.15–1.25 cm high. Cucullate staminode cream-colored, 1.1–1.2 cm long and 0.5 cm wide, provided with an apical filiform appendage to 1.5 mm high. Stamen with lateral petaloid appendage to

1.5 mm wide extending to the tip of the anther; anther 4.5 mm long. Style and stigma golden. Ovary white, glabrous, 3.5–4.5 mm high and to 2.5 mm in diameter. Capsules thin, pale cream-yellow, glabrous, smooth, obovoid, ca. 1.7 cm high and up to 0.9 cm wide, crowned by a persistent, enlarged calyx; sepals up to 1.45 cm wide at base. Seeds usually 3 per capsule, trigonous, rugose on outer surface, slate grey, 9–9.5 mm high and 4.5–5 mm in diameter, bearing a basal white aril to 3.5 mm high.

COSTA RICA: PUNTARENAS PROVINCE: Between Palmar Norte and Puerto Cortez, altitude 50 m, 6 August 1965, *A. Jimenez M. 2240* (F); Osa peninsula 8 km S of Rincon in swamp forest, 28 February 1965, *A. Jimenez M. 3024* (F); cultivated at Finca Las Cruces, property of Robt. Wilson, Las Cruces, 5–6 km S of San Vito de Java, from rhizomes collected in the forest NE of the Tropical Science Center field station, ca. 50 m elevation, 5 km W of Rincon de Osa; 8°42′ N, 83°31′ W; 23 September 1969, *H. Kennedy 384* (holotype F; isotypes COL, MO, US); Golfito, watershed forest, elevation ca. 20 m, 17 October 1970, *H. Kennedy 644* (DAV).

Flowering July to October. This species is pollinated at the type locality (Osa Peninsula) and adjacent Golfito area by *Euglossa asarophora* Moure. This species differs strikingly from other Costa Rican and Panamanian Marantaceae in that the under leaf, pulvinus, petiole and stem portions of the plant are dark red-purple, the undersurface of the leaf blade is covered with retrorsely barbed, hook-like hairs and in possessing appressed pilose cream to faint greenish recurved bracts.

The specific epithet vinosa refers to the dark burgundy color of the lower leaf surface and stem portions.

Calathea donnell-smithii K. Schum., Pflanzenreich IV. 48: 75. 1902.

Calathea picta sensu Woodson, Ann. Missouri Bot. Gard. 29: 334. 1942, *non* Hook. f.

This species was treated as *Calathea picta* by Woodson (1942). Plants collected at Cerro Campana, Panamá Province, Panamá, agree very well with photographs of the type of *C. donnell-smithii* and with plants collected in Costa Rica from an area cited by Schumann in the original description. These plants differ from *C. picta* in having no basal leaves, in bearing 4–6 leaves above the elongate stem internode instead of 2, in the presence of imbricate, glabrous, green bracts instead of semi-lax, straw-colored, velvety pubescent bracts with recurved margins, and in the plain green leaves instead of having a dark and light green color pattern above with dark purple below. *Calathea picta* Hook. f. is a synonym of *Calathea warscewiczii* (Math.) Koern., Gartenflora 7: 87. 1858.

Calathea latifolia (Willd. *ex* Link) Klotzsch *in* R. Schomburgk, Reisen Brit.—Guiana 3: 918. 1848.

Alpinia latifolia Willd. *ex* Link, Jahresber. 1(3): 22. 1820.
Thalia latifolia Link *ex* Roemer & Schultes, Mantissa 1: 10. 1822.
Calathea allouia var. *violacea* (Roscoe) Woodson, Ann. Missouri Bot. Gard. 29: 332, 1942, *sensu* Woodson, *non Phrynium violaceum* Roscoe.
Calathea violacea var. *hirsuta* Petersen, Fl. Bras. 3(3): 1890.

The combination *Calathea allouia* (Aubl.) Lindl. var. *violacea* (Roscoe) Woods. was intended for this species, but it was based on the Brazilian *Phrynium violaceum* Roscoe from Rio de Janeiro and must remain in the synonymy of that

species. I have compared living plants from Rio de Janeiro, Brazil, and Panama with Lindley's description of *Calathea violacea*, and the description clearly fits the Brazilian plant rather than the very different Panamanian plant. Specimens of each were sent to Kew for comparison with the Lindley material, and the identity of the Brazilian specimen was confirmed as *Calathea violacea* (Roscoe) Lindley. *Maranta clavata* Vell. and *Phrynium floribundum* Lem., which are both Brazilian and were listed by Woodson and Schery (1945) as synonyms of his variety *violacea*, are quite unlike the Panamanian plant, whatever their identity. This species, (*C. latifolia*) has also been confused with *Calathea allouia* (Aubl.) Lindl., which was first described as *Maranta allouia* by Aublet in 1775 and occurs in the West Indies and French Guiana. This plant is quite different from the above described species, the bracts of the two differing widely in form. The following species listed under *Calathea allouia* in the *Flora of Panama* (Woodson & Schery, 1945: 86) are not properly synonyms of either *C. allouia* or *C. latifolia*: *C. cylindrica* (Rosc.) Schum., *C. grandifolia* Lindl. and *C. macrosepala* Schum. Of the above species, only *Calathea macrosepala* occurs in Central America. Woodson's "pale yellow variety" (Woodson & Schery, 1942) is neither this species nor *C. macrosepala* Schum. but *C. marantifolia* Standl. which occasionally occurs sympatrically with *C. latifolia*. Experimental crosses have shown *C. marantifolia* and *C. latifolia* to be incompatible. Infrequently in Panamá, a form of *C. latifolia* with cream colored flowers is found in which the bracts are wholly green, sepals, petals and outer staminode are cream white. The cream colored flower is common in Colombia, Venezuela, and Trinidad but usually associated there with purple bracts. It is the cream flowered form which is confused with *C. marantifolia*.

Calathea marantifolia Standl., Jour. Washington Acad. Sci. 17: 250. 1927.

Calathea lagunae Woods., Ann. Missouri Bot. Gard. 29: 333. 1942.
Calathea allouia (Aubl.) Lindl., *sensu* Woodson (1942), *non* Aublet.

The type is an unusually small individual of the species but otherwise agrees with larger individuals collected by Standley and Valerio in the same area and at the same time. Standley (1937) states it "may be only a reduced form of *C. macrosepala* Schum." It is not, however, a form of *C. macrosepala* but a distinct species with a wide range and a concomitant amount of variation. This species has been frequently confused with *C. macrosepala* Schum. (in Standley, 1931, 1937) and with *C. latifolia* (Willd. *ex* Link) Klotzsch (in Woodson & Schery, 1945). *Calathea marantifolia* differs from these species in the structure of the leaf and in details of the capsule. Both *C. latifolia* and *C. macrosepala* die back to the rhizome during the dry season, while *C. marantifolia* is found in much wetter habitats and retains its leaves in the dry season.

Calathea leucostachya Hook. f., Bot Mag. *Pl. 6205*. 1875.

Calathea valeriana Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 190. 1937.

This species is reported for Costa Rica by Standley (1937) and recently has been found also in the Atlantic lowlands of Panamá.

PANAMÁ. COLÓN PROVINCE: Rio Guanche, ca. 1.5 miles upstream from the bridge, 17 July 1971, *H. Kennedy, R. Foster & R. L. Dressler 1157* (DAV).

Calathea leucostachya as pictured in Hooker's *Botanical Magazine* appears identical with plants collected near San Ramon, Costa Rica, close to the type locality of *C. valeriana*. The Panamanian plants differ in having the underside of the leaf pubescent rather than glabrous. This plant is very distinctive in its habit, pubescence and form of inflorescence.

Calathea cleistantha Standl., Jour. Washington Acad. Sci. 17: 250. 1927.

This species was previously reported only from Costa Rica near Guapiles. Specimens collected near La Mesa, in Coclé Province, agree well with material of this species collected at La Lola (near mile 28) Limón Province, Costa Rica, close to the type locality.

PANAMÁ. COCLÉ PROVINCE: El Valle de Antón, La Mesa, elevation ca. 800 m, 1 April 1973, *H. Kennedy, A. Kennedy & E. Kennedy 3030* (MO).

This species is very distinctive in having the inflorescences arise from the rhizome at ground level and the unusually long petals and outer staminode.

Hylaeanthe panamaensis (Standley) H. Kennedy comb. nov.

Myrosma panamensis Standl. Jour. Washington Acad. Sci. 15: 4. 1925.

This distinctive genus was described by Jonker-Verhoef and Jonker (1955: 175) and included four additional species, one of which, *H. hoffmannii* (Schum.) Jonk. & Jonk., occurs in Costa Rica. This species was not mentioned by Jonker-Verhoef and Jonker, but agrees in all respects with *Hylaeanthe*.

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